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Feto-placental development in the rabbit is altered by maternal food restriction from early pregnancy

Maternal under-nutrition can induce Intrauterine Growth Restriction by placental insufficiency. To determine the consequences in the rabbit feto-placental unit, 32 pregnant rabbits were allocated in three feeding groups: ad libitum diet (Group C; n=9); restricted to 50% of their ad libitum intake during the pre-implantational period (Day 0 to Day 7) (Group PR; n=11) or restricted from Day 0 to Day 28 (Group TR; n=12). On Day 28, dams were euthanized. Fetuses were counted, measured and weighed. Brain and liver ratios (organ/fetal weight), and placental efficiency (fetal/placental weight) were calculated. Placenta apoptosis (TUNEL) and atrophy rates measured as thinning of the labyrinth zone with lesser capillaries and fibrosis (H&E stain) were subjectively assessed. No differences were found in the resorptions, macerated and viable fetuses per doe. TR fetuses showed the lowest weight ($P<0.05$) and crown-rump length ($P<0.05$) compared to PR and C groups. Brain ratio was higher in both restricted groups compared to group C ($P<0.05$). Liver ratio was higher in C group than TR and PR groups ($P<0.05$). The lowest placental weight but the highest placental efficiency was found in TR group compared to PR and C groups ($P<0.05$). Restriction was related to atrophy signs in the labyrinthine zone. Groups PR and TR showed similar high apoptotic levels in decidua basalis and labyrinthine zones, however, at the junctional zone TR showed the highest value ($P<0.05$). In conclusion, maternal food restriction alters feto-placental development being sufficient an application during the pre-implantational period to hinder placental structure and function, affecting fetal organogenesis in the rabbit model.

Funded by AGL2011-23822 and CM (S2013/ABI-2913).